RGEG Position Evaluation Report

Researcher: Robert Filbert

Peer Group: Sensors, Instrumentation, and Measurement
Previously classified as grade: GS-13

Summary Scores

Factor I – Research Assignment	Factor II – Supervision Received	Factor III – Guidelines and Originality	Factor IV – Qualifications and Contributions
C	C	D	C

Total Score: 32 **Grade Conversion:** GS-13

Factor I – Research Assignment

The panel assigned Degree C for this factor because:
The incumbent develops simulations and models to predict and interpret quantitative nondestructive evaluation (NDE) of structures, research and provide quantitative image and data processing analysis techniques, and design validating experimental procedures. He addresses problems of considerable difficulty with novel approaches. He provides the software engine to take measurements, constructs a numerical model, and extracts the relevant information. For example, his work in the area of IR measurement helped lead to the development of an approach to link the IR emission to a physical or geometric property of the material. This improved field systems used in many different tests, and the approach is still the industry standard method for IR-based NDE. He takes his modeling experience and applies it to a variety of problems in NDE, including developing new IR-based NDE equipment and developing numerical simulations for ultrasonic- and megacycles-based NDE instrumentation. His work has been applied to work for DoD and Shuttle vehicle analysis.

The requirements for Degree C are fully met.

Factor II – Supervision Received

The panel assigned Degree C for this factor because:
The incumbent is generally assigned broad problem areas and allowed to solve problems with little direct supervision. Many of the projects to which he is assigned require the development of new methodologies for solving and the recommendations of the incumbent are typically followed by the branch. He presents his results to the project customers. He is the Langley representative on the USP Inspection Working Group based at Marshall Space Flight Center.

The requirements for Degree C are fully met.

Factor III – Guidelines and Originality

The panel assigned Degree D for this factor because:
Many of the commercially available software packages are currently insufficient for modeling NDE of complex aerospace structures, and the incumbent applies a substantial level of

creativity in developing novel simulation methods for these. Examples of this creativity include designing new simulation methods for determining the viability of using imaging to evaluate damage to aircraft lap joints *in situ*, the development of techniques for the automation of ultrasonic data reduction, and the development of novel algorithms for IR and radiographic NDE techniques that increase the signal-to-noise ratio allowing the use of less expensive detector systems. The incumbent's work with derivative-based IR imaging as an NDE method contributed to the development of the industry standard for evaluating structures using IR-based measurements.

The requirements for Degree C are exceeded but those for Degree E are not fully met.

Factor IV – Qualifications and Contributions

The panel assigned Degree C for this factor because:

The incumbent has been consistently productive and has had significant accomplishments in the field of NDE. For example:

- Has developed novel algorithms for the automation of ultrasonic and radiographic NDE techniques. His techniques have improved corrosion and defect classification and allow the use of less expensive detector systems through the reduction of noise and the maintenance of required signal levels.
- Developed numerical simulations or ultrasonic methods incorporating realistic experimental conditions. These simulations (and verification through experimentation) have led to an improved understanding of IR-based NDE and especially in the area of delaminations. He showed that the standard method of determining an ultrasonic technique's sensitivity to delamination is insufficient.

Recognition of the incumbent's expertise is emerging both inside and outside the agency, as evidenced by several tasks:

- For MSFC, he provided numerical simulations to evaluate impact damage to the outer composite casing of a Transfer Orbit Stage motor, leading to a procedure for quantitative defect depth inspections.
- For the FAA, he provided numerical simulations to evaluate a passive imaging technique for aircraft lapjoint inspection *in situ*. The simulations showed that it was not a viable approach.
- The incumbent is an active participant in the Shuttle Return to Flight Program and is developing improved data reduction methods for megacycles imaging of the Shuttle External Tank foam and measurement for Shuttle Reinforced Carbon-Carbon tiles.

Additionally, his knowledge is recognized by serving on the program committee at SPIE's annual meeting for Optical Systems Engineering and as session chair. He is the author or co-author of several conference publications and has received some awards for work at Langley.

The requirements for Degree C are fully met.

General comments:
The RDCP package was well written, informative, and addressed all the required areas. The incumbent is generally thought of as very intelligent, easy to work with, and shows creativity and flexibility. Additionally, he is recognized as an emerging leader in the field of numerical modeling and simulation for NDE. Contacts confirmed the incumbent's leadership qualities in the mentorship of students as well as acknowledgement of hard-work, creativity, the ability to adapt to a variety of situations, and the ability to work either independently or as part of a team.